Prairie View Renewable Energy Facility
Wilmington, IL
Preliminary Project Description
August 2009

General Description

The proposed Prairie View Renewable Energy Facility will initially produce 4.8 gross MW of electrical power from 3 Caterpillar G3520C engine generators fueled by landfill gas. The preliminary design of the initial facility includes space for 1 additional G3520C and is expandable up to 8 total G3520C engine generators for a total potential future output of 12.8 gross MW. Internal facility loads consume approximately 5% of the generated electrical power reducing the net electrical export to approximately 12.2 MW. Drawings of the conceptual facility design and location are attached for reference.

Engine Generators

The Caterpillar G3520C engine generators proposed for this facility are internal combustion engines specifically designed for low heat content fuels such as landfill gas. Each 1200 RPM, 2233 HP engine consumes approximately 550-600 SCFM of landfill gas depending on the actual gas composition and produces 1.6 MW of electrical power. Caterpillar technical information is attached for reference.

Gas Treatment

Subject to final engineering and equipment selection, the preliminary choice for gas compression is a Tuthill 1224-82 rotary lobe gas compressor. The compressor will be fitted with a 250 HP electric motor connected to a variable frequency drive that will modulate the gas compressor speed based on pressure control to the engines, thereby minimizing the electrical power consumption of the compressor. This gas compressor is sized to supply landfill gas fuel to up to 4 G3520C engine generators. Should the facility be expanded beyond 4, the compressor would be either replaced or an additional gas compressor added. Preliminary specifications and performance information for this gas compressor is attached for reference.

Landfill gas can contain water vapor up to saturated conditions. As the landfill gas is compressed, cooled, and filtered, water is condensed from the gas. The flow of water from the system for the initial 3 G3520C facility is expected to be approximately 1-3 gallons per minute depending on ambient conditions and actual moisture content of the gas collected. Any water produced from this system will be handled consistently with current landfill gas condensate and landfill leachate handling practices at the site.

Electrical Grid Interconnect

An interconnect study has not been initiated for this project. Our preliminary assessment indicates that the electrical interconnect would be with Commonwealth Edison, however the interconnection voltage has not yet been determined. The proposed G3520 engine generators produce electrical power at 4160 V, therefore the facility will include the necessary generator step up transformer and other electrical equipment required to

facilitate this interconnect. The facility also includes a step down transformer to produce the 480 V supply to the facility's internal parasitic loads.

Power Sales

The net power produced from this facility will be sold on the wholesale electrical power market.

Permitting

The air quality permit for this project is expected to be the critical path related to required permits for the project. The application process has not been initiated at the writing of this project summary. Assuming a start on the permit application by October 2009, we expect that an air quality permit could be obtained by July 2010.

A detailed review of other permit requirements has not yet been conducted for this project, however we expect that, if required, a site plan approval could be obtained to allow the receipt of a building permit by the time an air permit is issued.

Schedule

The engineering, permitting, and procurement for this project has not started. A preliminary project schedule is attached based on the assumption of an engineering and permitting start in October 2009. A February 2011 operations start appears to be feasible based on current project information.

Attachments:

1. Conceptual Facility Layout
2. Conceptual Facility Location
3. Caterpillar G3520C Technical Information
4. Gas Compression Technical Information
5. Preliminary Project Schedule

G3520C

GAS ENGINE TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED	1200	FUEL:	LOW ENERGY (1.43 CH4:CO2 RATIO)
COMPRESSION RATIO	11.3:1	FUEL SYSTEM:	CAT LOW PRESSURE WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 1 MAX. INLET (°F)	218		
AFTERCOOLER - STAGE 2 MAX. INLET (°F)	130	FUEL PRESS. RANGE (PSIG):	1.5 - 5.0
JACKET WATER - MAX. OUTLET (°F):	230	MIN. METHANE NUMBER	135
COOLING SYSTEM:	JW+1AC, OC+2AC	RATED ALTITUDE (FT)	1378
IGNITION SYSTEM:	ADEM3	AT AIR TO TURBO. TEMP. (°F):	77
SPARK PLUG TYPE:	J-GAP	NOx EMISSION LEVEL:	0.5 g/bhp-hr
EXHAUST MANIFOLD:	DRY	FUEL LHV (BTU/SCF):	456
COMBUSTION	LOW EMISSION	APPLICATION:	GENSET

RATING AND EFFICIENCY		NOTES	LOAD	100%	75%	50%
ENGINE POWER	(WITHOUT FAN)	(1)	BHP	2233	1675	1116
GENERATOR POWER	(WITHOUT FAN)	(2)	EKW	1600	1200	800
ENGINE EFFICIENCY	**(ISO 3046/1)**	**(3)**	**%**	**40.1**	**38.6**	**36.1**
ENGINE EFFICIENCY	(NOMINAL)	(3)	%	39.1	37.7	35.2
THERMAL EFFICIENCY	(NOMINAL)	(4)	%	41.3	40.6	42.2
TOTAL EFFICIENCY	(NOMINAL)	(5)	%	80.4	78.3	77.4

ENGINE DATA						
FUEL CONSUMPTION	**(ISO 3046/1)**	**(6)**	**BTU/bhp-hr**	**6354**	**6592**	**7047**
FUEL CONSUMPTION	(NOMINAL)	(6)	BTU/bhp-hr	6509	6753	7219
AIR FLOW (77 °F, 14.7 psi)		(7)	SCFM	4512	3415	2286
AIR FLOW		(7)	lb/hr	20006	15141	10136
COMPRESSOR OUT PRESSURE			in. HG (abs)	105.8	80.8	55.5
COMPRESSOR OUT TEMPERATURE			°F	375	306	220
AFTERCOOLER AIR OUT TEMPERATURE			°F	142	138	135
INLET MAN. PRESSURE		(8)	in. HG (abs)	94.4	71.5	48.9
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(9)	°F	142	138	135
TIMING		(10)	°BTDC	27	27	27
EXHAUST STACK TEMPERATURE		(11)	°F	898	943	984
EXHAUST GAS FLOW (@ stack temp.)		(12)	CFM	12476	9780	6770
EXHAUST MASS FLOW		(12)	lb/hr	22318	16940	11418

EMISSIONS DATA					
NOx (as NO2)	(13)	g/bhp-hr	0.5	0.5	0.5
NTE CO	(14)	g/bhp-hr	4.13	4.25	4.4
NOMINAL CO	(15)	g/bhp-hr	2.5	2.5	2.5
THC (molecular weight of 15.84)	(14)	g/bhp-hr	5.84	6.49	7.51
NMHC (molecular weight of 15.84)	(14)	g/bhp-hr	0.88	0.98	1.13
EXHAUST O2	(16)	% DRY	9.0	8.8	8.6
LAMBDA	(16)		1.71	1.67	1.57

HEAT BALANCE DATA					
LHV INPUT	(17)	BTU/min	242216	188451	134313
HEAT REJECTION TO JACKET	(18)	BTU/min	28738	23806	21929
HEAT REJECTION TO ATMOSPHERE	(19)	BTU/min	7210	6034	4857
HEAT REJECTION TO LUBE OIL	(20)	BTU/min	10108	9524	8917
HEAT REJECTION TO EXHAUST (LHV to 77°F)	(21)	BTU/min	76779	65253	45101
HEAT REJECTION TO EXHAUST (LHV to 350°F)	(21)	BTU/min	57574	47602	34587
HEAT REJECTION TO A/C - STAGE 1	(22)	BTU/min	13823	5157	102
HEAT REJECTION TO A/C - STAGE 2	(23)	BTU/min	8895	5684	4086

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1. DATA REPRESENTS CONDITIONS OF 77°F, 29.6 IN HG BAROMETRIC PRESSURE, 30% RELATIVE HUMIDITY, 10 IN H2O AIR FILTER RESTRICTION, AND 20 IN H2O EXHAUST STACK PRESSURE. ENGINE EFFICIENCY AND FUEL CONSUMPTION SPECIFICALLY NOTED AS ISO 3046/1 ARE REPRESENTED WITH 5 IN H2O AIR FILTER RESTRICTION AND 0 IN H2O EXHAUST STACK PRESSURE. CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE. NO OVERLOAD PERMITTED AT RATING SHOWN.

EMISSION LEVELS ARE BASED ON THE ENGINE OPERATING AT STEADY STATE CONDITIONS AND ADJUSTED TO THE SPECIFIED NOx LEVEL AT 100% LOAD. EMISSION TOLERANCES SPECIFIED ARE DEPENDENT UPON FUEL QUALITY. METHANE NUMBER CANNOT VARY MORE THAN ± 3. PUBLISHED PART LOAD DATA IS WITH AIR FUEL RATIO CONTROL.

ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS. PUMP POWER IS NOT INCLUDED IN HEAT BALANCE DATA.

FOR NOTES INFORMATION CONSULT PAGE THREE.

FUEL USAGE GUIDE

CAT METHANE NUMBER	40	50	60	70	80	90	100	110	120	130	140	150
IGNITION TIMING	-	-	-	-	-	-	-	-	24	26	28	30
DERATION FACTOR	0	0	0	0	0	0	0	0	1.00	1.00	1.00	1.00

ALTITUDE DERATION FACTORS

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	0.96	0.93	0.89	0.86	0.83	0.79	0.76	0.74	0.71	0.68	0.65	0.63	0.60
120	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.64	0.61
110	0.99	0.96	0.92	0.89	0.86	0.82	0.79	0.76	0.73	0.70	0.68	0.65	0.62
100	1.00	0.97	0.94	0.90	0.87	0.84	0.81	0.77	0.74	0.72	0.69	0.66	0.63
90	1.00	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.65
80	1.00	1.00	0.97	0.94	0.90	0.87	0.84	0.80	0.77	0.74	0.71	0.68	0.66
70	1.00	1.00	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67
60	1.00	1.00	1.00	0.97	0.94	0.90	0.87	0.83	0.80	0.77	0.74	0.71	0.68
50	1.00	1.00	1.00	0.99	0.96	0.92	0.88	0.85	0.82	0.79	0.76	0.73	0.70

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1.33	1.37	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
120	1.26	1.31	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
110	1.19	1.24	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26
100	1.13	1.17	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
90	1.06	1.11	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
80	1.00	1.04	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

ALTITUDE (FEET ABOVE SEA LEVEL)

FREE FIELD MECHANICAL & EXHAUST NOISE

100% Load Data			dB(A)	(dB)							
Free Field Mechanical	DISTANCE FROM THE ENGINE (FEET)	3.2	108.5	51.5	78.7	88.2	92.0	99.9	97.3	93.2	99.2
		22.9	91.6	34.6	59.0	68.1	74.0	83.0	79.4	75.1	85.2
		49.2	85.0	28.0	55.2	64.7	69.4	76.4	73.8	69.7	75.7
Free Field Exhaust	DISTANCE FROM THE ENGINE (FEET)	4.9	106.1	67.5	86.5	96.0	88.5	88.7	90.1	95.6	92.7
		22.9	92.7	54.1	73.1	82.6	75.1	75.3	76.7	82.2	79.3
		49.2	86.1	47.5	66.5	76.0	68.5	68.7	70.1	75.6	72.7
			Overal SPL	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 khz

Octave Band Center Frequency (OBCF)

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel. Note that deration occurs as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar Methane Number Calculation program.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site.

INLET AND EXHAUST RESTRICTION CORRECTIONS FOR ALTITUDE CAPABILITY:

To determine the appropriate altitude derate factor to be applied to this engine for inlet or exhaust restrictions differing from the standard conditions listed on page 1, a correction to the site altitude can be made to adjust for this difference. Add 141 feet to the site altitude for each additional inch of H2O of exhaust stack pressure greater than spec sheet conditions. Add 282 feet to the site altitude for each additional inch of H2O of inlet restriction greater than spec sheet conditions. If site inlet restriction or exhaust stack pressure are less than spec sheet conditions, the same trends apply to lower the site altitude.

ACTUAL ENGINE RATING:

It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative. They are not to be added together. The same is true for the Low Energy Fuel deration (reference the Caterpillar Methane Number Program) and the Fuel Usage Guide deration. However, the Altitude/Temperature deration and Low Energy Fuel deration are cumulative and they must be added together in the method shown below. To determine the actual power available, take the lowest rating between 1) and 2).

1) (Altitude/Temperature Deration) + (Low Energy Fuel Deration)
2) Fuel Usage Guide Deration

Note: For NA's always add the Low Energy Fuel deration to the Altitude/Temperature deration. For TA engines only add the Low Energy Fuel deration to the Altitude/Temperature deration whenever the Altitude/Temperature deration is less than 1.0 (100%). This will give the actual rating for the engine at the conditions specified.

AFTERCOOLER HEAT REJECTION FACTORS:

Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant air inlet manifold temperature, as the air to turbo temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail. For 2 Stage Aftercoolers with separate circuits, the 1st stage will collect 90% of the additional heat.

SOUND DATA:

Data determined by methods similar to ISO Standard DIS-8528-10. Accuracy Grade 3. SPL = Sound Pressure Level.

NOTES

1 ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS. TOLERANCE IS ± 3% OF FULL LOAD.

2 GENERATOR POWER DETERMINED WITH AN ASSUMED GENERATOR EFFICIENCY OF 96.1% AND POWER FACTOR OF 0.8 [GENERATOR POWER = ENGINE POWER x GENERATOR EFFICIENCY].

3 ISO 3046/1 ENGINE EFFICIENCY TOLERANCE IS (+)0, (-)5% OF FULL LOAD % EFFICIENCY VALUE. NOMINAL ENGINE EFFICIENCY TOLERANCE IS ± 2.5% OF FULL LOAD % EFFICIENCY VALUE.

4 THERMAL EFFICIENCY: JACKET HEAT + STAGE 1 A/C HEAT + EXH. HEAT TO 350°F.

5 TOTAL EFFICIENCY = ENGINE EFF. + THERMAL EFF. TOLERANCE IS ± 10% OF FULL LOAD DATA.

6 ISO 3046/1 FUEL CONSUMPTION TOLERANCE IS (+)5, (-)0% OF FULL LOAD DATA. NOMINAL FUEL CONSUMPTION TOLERANCE IS ± 2.5 % OF FULL LOAD DATA.

7 UNDRIED AIR. FLOW TOLERANCE IS ± 5 %

8 INLET MANIFOLD PRESSURE TOLERANCE IS ± 5 %

9 INLET MANIFOLD TEMPERATURE TOLERANCE IS ± 9°F.

10 TIMING INDICATED IS FOR USE WITH THE MINIMUM FUEL METHANE NUMBER SPECIFIED. CONSULT THE APPROPRIATE FUEL USAGE GUIDE FOR TIMING AT OTHER METHANE NUMBERS.

11 EXHAUST STACK TEMPERATURE TOLERANCE IS (+)63°F, (-)54°F.

12 WET EXHAUST. FLOW TOLERANCE IS ± 6 %

13 NOX TOLERANCES ARE ± 18 % OF SPECIFIED VALUE.

14 NTE CO, CO2, THC, and NMHC VALUES ARE "NOT TO EXCEED".

15 NOMINAL CO IS A NOMINAL VALUE AND IS REPRESENTATIVE OF A NEW ENGINE DURING THE FIRST 100 HOURS OF ENGINE OPERATION.

16 O2% TOLERANCE IS ± 0.5; LAMBDA TOLERANCE IS ± 0.05. LAMBDA AND O2 LEVEL ARE THE RESULT OF ADJUSTING THE ENGINE TO OPERATE AT THE SPECIFIED NOX LEVEL.

17 LHV RATE TOLERANCE IS ± 2.5%.

18 TOTAL JW HEAT (based on treated water) = JACKET HEAT + STAGE 1 A/C HEAT + 0.90 x (STAGE 1 + STAGE 2) x (ACHRF-1). TOLERANCE IS ± 10 % OF FULL LOAD DATA.

19 RADIATION HEAT RATE BASED ON TREATED WATER. TOLERANCE IS ± 50% OF FULL LOAD DATA.

20 LUBE OIL HEAT RATE BASED ON TREATED WATER. TOLERANCE IS ± 20% OF FULL LOAD DATA.

21 EXHAUST HEAT RATE BASED ON TREATED WATER. TOLERANCE IS ± 10% OF FULL LOAD DATA.

22 STAGE 1 A/C HEAT (based on treated water) = STAGE 1 A/C HEAT + 0.90 x (STAGE 1 + STAGE 2) x (ACHRF-1). TOLERANCE IS ± 5 % OF FULL LOAD DATA.

23 STAGE 2 A/C HEAT (based on treated water) = (STAGE 2 A/C HEAT + (STAGE 1 + STAGE 2) x 0.10 x (ACHRF - 1)) + LUBE OIL HEAT. TOLERANCE IS ± 5 % OF FULL LOAD DATA.

PERFORMANCE

	Tuthill 1224-82
Flow – SCFM	2500
Inlet Pressure (PSIA)	11.8
Inlet Temperature (°F)	100
Gas	Landfill
Molecular Weight	27.318
K (Cp/Cv)	1.296
Disch. Pressure (PSIG)	8.0
Ambient Temperature (°F)	100
Elevation (ft. ASL)	800
Speed (rpm)	1350
% of max. allowable speed	75
BHP	238
Motor HP	250
Discharge Temp. (°F)	275
Model	Tuthill 1224-82

ROTARY LOBE BLOWER DESIGN

- Rotary Lobe Gas Blowers, Oil Free
- Oil sumps on both ends of blower
- Cast Iron casing, ductile iron rotors – 2 lobe
- Integral pressure lubrication with shaft driven pump, oil filter, regulating valve
- Mechanical carbon ring seals
- 100 psig case rating, helical timing gears, drive shaft (5^{th}) bearing, cartridge type mechanical seals
  Tuthill additional features
- Discharge Carbon Steel Chamber-Absorptive Silencer with manual low point drain valve

BLOWER LUBE OIL SYSTEM

- Integral shaft driven pump on blower
- Sumps in blower end covers
- Immersion oil heater
- Filter designed for 3 month continuous duty life
- Oil sampling valve upstream of filter
- 3 way thermostatic oil temperature control valve
- lube oil cooling section in fin fan cooler
- 304SS tubing and fittings on oil lines

ELECTRIC MOTOR DATA

- 250 HP Severe Duty, High Efficiency, 1800 RPM, WEG, TEFC Induction Motor, 1.15 S.F.
- suitable for variable frequency drive, Cl. I, Grp. C & D, Div. 2 area classification
- Horizontal foot mounted, frame 447T
- Class F insulation, Class B rise
- 460 Volts /3ph/60Hz
- Heavy Duty adjusting bolt motor slide rails

HEAT EXCHANGERS and GAS CONDITIONING

- (1) FIN-X Air Cooled Heat Exchanger Model HL60-10
- 304SS tubes and SA516-70 CS headers (stress relieved)
- Horizontal air flow
- Manual louvers w/ ground level operator
- 7.5/1.9 HP, TEFC fan motor, 1800/900 rpm, 460 Volts, 3-Phase, 60 Hertz
- Metrix vibration switch

- (1) Gas to Gas Heat Exchanger 12" X 36"
- Type E, TEMA C, 304SS shell and tubes, tubesheet and baffles
- 5/8" OD tubes, 18 BWG, .001 fouling factor

- (1) Non-ASME Code CS Suction Separator, epoxy internal coating, 1/8" C.A. with 304SS mesh pad, full opening blind flange with davit arm, drain valve, sight gauge and high level switch, level controller and Wilden polyethylene diaphragm pump, 36" dia.

- (1) Non-ASME Code, 304SS Discharge Filter Condensate Separator with .4 micron removable coalescing element, manway lid with davit arm, manual drain valve, sight gauge, high level switch, level controller with pneumatic actuated dump valve, 30" dia., access ladder and platform provided, bolted to vessel clips.

CONTROLS, INSTRUMENTATION and VALVES

1 - **MURPHYMATIC®** CONTROL PANEL HOUSED IN A SOLAR GRAY, 30X24X9 ENCLOSURE WITH A REMOVABLE REAR DOOR AND A HINGED FRONT DOOR WITH A VIEWING GLASS WINDOW. ENCLOSURE MOUNTED ON A 22" FREESTANDING BASE. THE PANEL TO INCLUDE:

1 - S400 **SELECTRONIC® MICRO-CONTROLLER™** FOR:

DIGITAL INPUTS:

- START
- STOP
- RESET
- TEST
- LOW SUCTION PRESSURE
- LOW DISCHARGE PRESSURE
- BLOWER LOW OIL PRESSURE
- HIGH SUCTION PRESSURE
- HIGH DISCHARGE PRESSURE
- HIGH SUCTION TEMPERATURE
- HIGH DISCHARGE TEMPERATURE
- HIGH SUCTION SCRUBBER LIQUID LEVEL
- HIGH DISCHARGE SCRUBBER LIQUID LEVEL
- BLOWER HIGH OIL TEMPERATURE
- MOTOR VIBRATION
- COOLER VIBRATION

- BLOWER VIBRATION
- BLOWER LOW OIL LEVEL
- REMOTE ESD (INTERPOSING RELAY)
- LOCAL EMERGENCY STOP

DIGITAL OUTPUTS:

- FAN MOTOR SPEED LOW/HIGH
- BLOWER MOTOR
- BLOWER SHUTDOWN
- OIL HEATER STARTER

1 - LEGEND HOLDER

2 - OPLFC-S-XXXX, 4 ½" PRESSURE **SWICHGAGE®** INSTRUMENTS FOR:

- SUCTION PRESSURE – 30V15
- DISCHARGE PRESSURE – 15

1 - SPLFC-250S20, 4 ½" TEMPERATURE **SWICHGAGE®** FOR: **(SEE NOTE #1)**

- SUCTION TEMPERATURE

1 - SPLFC-350S15, 4 ½" TEMPERATURE **SWICHGAGE®** FOR: **(SEE NOTE #1)**

- DISCHARGE TEMPERATURE

6 - 5A HERMETICALLY SEALED RELAYS WITH SOCKETS FOR:

- FAN MOTOR SPEED
- BLOWER MOTOR
- CUSTOMER ESD (120VAC)
- BLOWER SHUTDOWN
- BLOWER CONTROL OIL HEATER STARTER

1 - AMOT VALVE – 4057D025H1 FOR:

- PULL TO READ SUCTION VACUUM

1 - MERIAM MONOMETER 10AA25WM30" **(SEE NOTE #1)**

1 - GROVE AIR HORN **(SEE NOTE #1)**

1 - VERSA SOLENOID VALVE

1 - PUSHBUTTON MAINTAINED WITH CONTACT BLOCK FOR:

- LOCAL EMERGENCY STOP

4 - PUSHBUTTONS WITH CONTACT BLOCKS FOR:

- START
- STOP
- RESET
- TEST

1 - 2 POSITION SWITCH WITH CONTACT BLOCK FOR:

- POWER OFF-ON

1 - POWER SUPPLY 110 VAC/24 VDC

1 – UNITED ELECTRIC B117-120 HERMETICALLY SEALED THERMOSTAT

1 – NELSON HEAT TRACE

ALL NECESSARY NAMEPLATES AND TERMINAL BLOCKS

NOTES:

1. STAINLESS STEEL TUBING WITH STEEL FITTING
2. PANEL POWERED OFF CUSTOMER SUPPLIED 110 VAC
3. PANEL UL LISTED FOR CLASS I, DIV. 2, GROUP C & D LOCATIONS
4. ENCLOSURE WILL MEET NEMA I SPECIFICATIONS

CLARIFICATIONS

1. PANEL ONLY U.L. LISTED FOR CLASS I, DIVISION 2, GROUPS C & D.

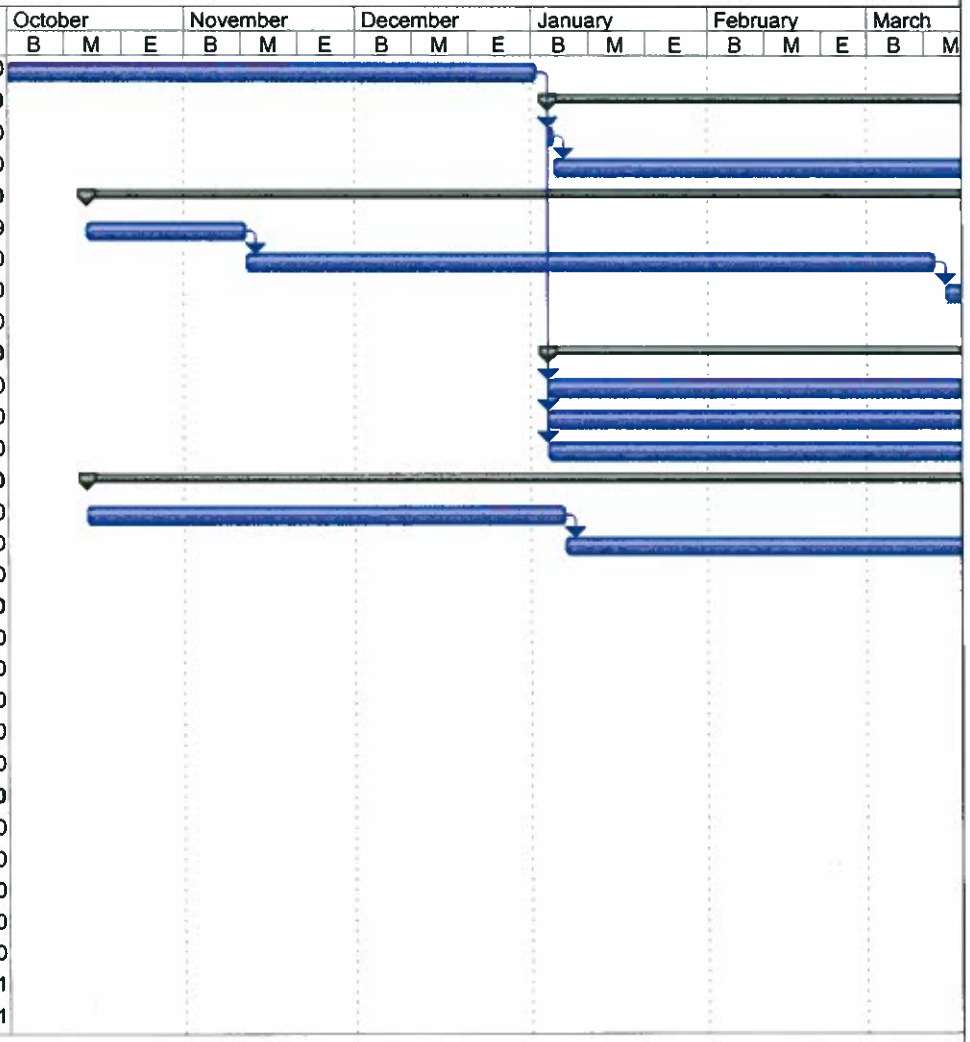
- Discharge Pressure Relief Valve set @ 14 psig
- Local Pressure and Temperature Indicators where called out on the P&ID
- Differential Pressure Gauge across after filter
- Inlet Check Valve – wafer type, CI body SS internals
- Misc. drain, vent and block valves are CS body with SS trim
- Butterfly valve air actuated with I/P positioner for bypass of gas to suction for 100% flow control turndown, with Norriseal pneumatic pressure indicating controller (discharge pressure sensing line tubed in field by customer)
- Inlet Butterfly Valve with hand lever actuator
- Skid inlet connection size: 12"
- Skid discharge connection size: 10"

BASE & FABRICATION DETAILS

- Structural steel skid with 304SS interconnecting piping, utilizing butt weld 304 SS stub ends and CS lap joint flanges, expansion joints, inlet and discharge of each blower are 321SS bellows, CS flanges, all wet gas in contact with gas stream is 304SS.
- Non-skid surface treatment. Skid is concrete filled.
- Oilfield type drag skid with pull bars, both ends, leveling jack bolts and anchor bolt holes.
- SSPC-1 cleaning, primer coat and top coat enamel paint on carbon steel surfaces
- All components mounted on skid and completely piped and wired
- V-Belt Drive with OSHA fully enclosed expanded metal guard
- Control panel functionality test
- Heat Trace and Insulation of all drain lines and lower portions of vessels.

Prairie View Renewable Energy Facility
Preliminary Project Schedule

ID	Task Name	Duration	Start	Finish
1	Negotiate WM/ Will County Contract	67 days	Thu 10/1/09	Fri 1/1/10
2	**Engineering**	**71 days**	**Mon 1/4/10**	**Mon 4/12/10**
3	Engineering Kick-Off	1 day	Mon 1/4/10	Mon 1/4/10
4	Bid Level Design	70 days	Tue 1/5/10	Mon 4/12/10
5	**Permitting**	**130 days**	**Thu 10/15/09**	**Wed 4/14/10**
6	Air Quality Permit Application	20 days	Thu 10/15/09	Wed 11/11/09
7	Air Permit Agency Review	87 days	Thu 11/12/09	Fri 3/12/10
8	Public Notice	23 days	Mon 3/15/10	Wed 4/14/10
9	Air Permit Issuance	0 days	Wed 4/14/10	Wed 4/14/10
10	**Procurement**	**180 days**	**Mon 1/4/10**	**Fri 9/10/10**
11	Engine Generators	153 days	Mon 1/4/10	Wed 8/4/10
12	Gas Compression	153 days	Mon 1/4/10	Wed 8/4/10
13	Electrical	180 days	Mon 1/4/10	Fri 9/10/10
14	**Interconnect**	**305 days**	**Thu 10/15/09**	**Wed 12/15/10**
15	Feasibility Study	60 days	Thu 10/15/09	Wed 1/6/10
16	Engineering	71 days	Thu 1/7/10	Thu 4/15/10
17	Construction	174 days	Fri 4/16/10	Wed 12/15/10
18	**Bidding Contracting**	**53 days**	**Tue 4/13/10**	**Thu 6/24/10**
19	Prebid Notice	1 day	Tue 4/13/10	Tue 4/13/10
20	Prebid Meeting	1 day	Wed 5/5/10	Wed 5/5/10
21	Bids Received	1 day	Thu 6/3/10	Thu 6/3/10
22	Bid Review	15 days	Fri 6/4/10	Thu 6/24/10
23	Issue Contracts	0 days	Thu 6/24/10	Thu 6/24/10
24	**Construction**	**136 days**	**Fri 6/25/10**	**Fri 12/31/10**
25	Mobilize	1 day	Fri 6/25/10	Fri 6/25/10
26	Set Engines and Compression	1 day	Thu 8/5/10	Thu 8/5/10
27	Set Electrical Equipment	1 day	Mon 9/13/10	Mon 9/13/10
28	Facility Construction	135 days	Mon 6/28/10	Fri 12/31/10
29	Substantial Completion	0 days	Fri 12/31/10	Fri 12/31/10
30	**Commissioning**	23 days	Mon 1/3/11	Wed 2/2/11
31	**Commercial Operation**	1 day	Thu 2/3/11	Thu 2/3/11



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Date: Fri 8/28/09

Task
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Progress
Milestone
Summary
Project Summary
External Tasks
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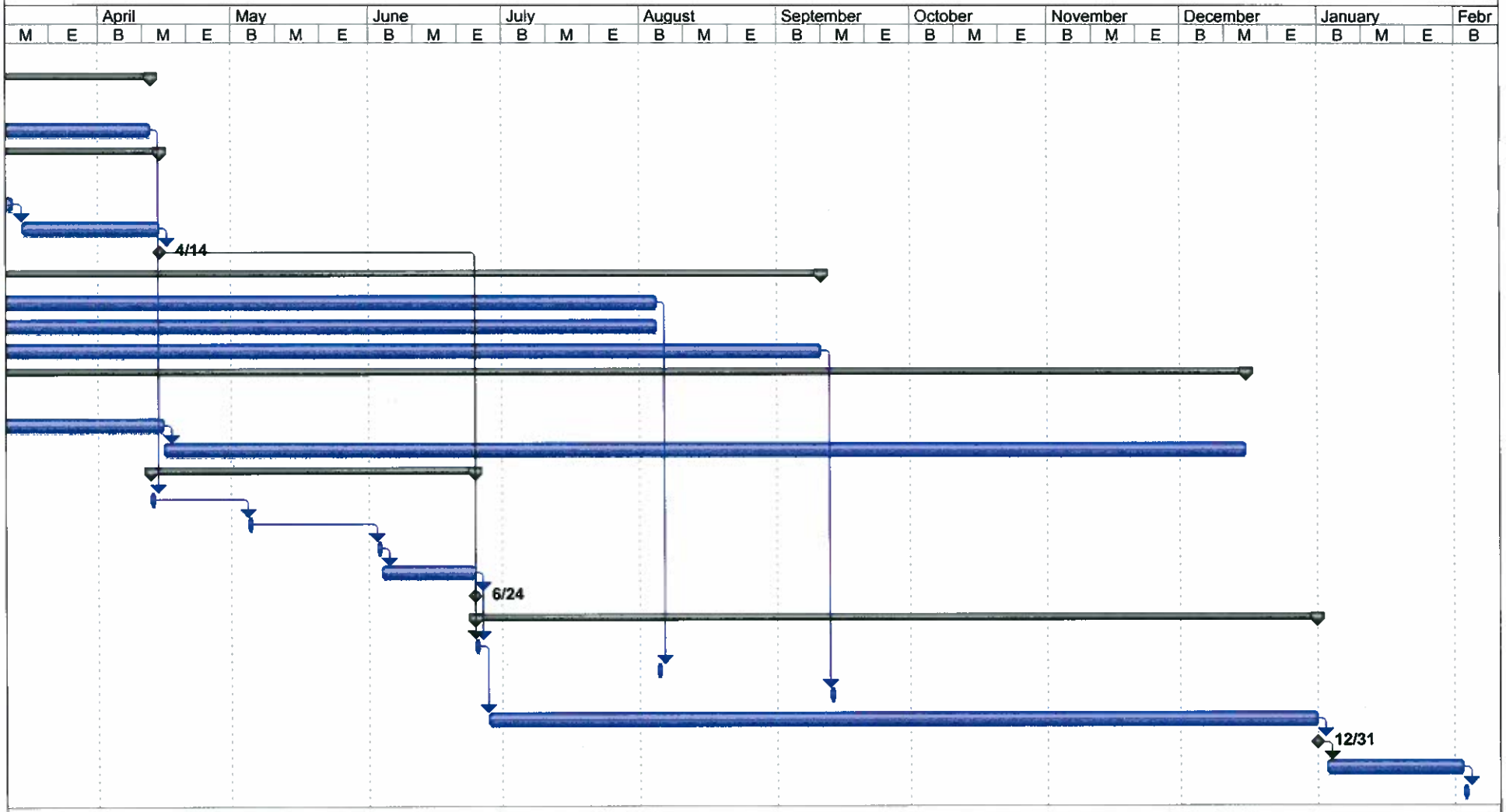
Deadline

Prairie View Renewable Energy Facility
Preliminary Project Schedule



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